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APPLICATION OF COPPER SULPHATE TO BASIN WALLS FOR CONTROL OF ALGAE[1]

By George F. Gilkison[2]

The object of this paper is not to introduce a new method for the control of algae, but rather to show how the Kansas City, Missouri, Water Department has, by changing the application of copper sulphate from the water to the basin walls, been able to control this annoying growth in their clear water basins.

Kansas City takes its water supply from the Missouri River at the Quindaro pumping station, 10 miles above the city. This station has a basin capacity of 90,000,000 gallons. The water is purified by sedimentation aided by coagulation and chlorination. It is then delivered to the Turkey Creek station, which is the distributing station. There are seven storage basins with a total capacity of 38,000,000 gallons located at different points throughout the city. It is in these basins that the algae growth causes the most annoyance. The basin becomes very unsightly, due to the fact that Spirogyra predominates and appears in long filaments throughout the basin. It also causes trouble in the meters by stopping up the strainers. At times offensive odors are generated due to the development of Anabaena and other blue-green algae.

The method first used to control this growth was to scrub the walls with long-handled wire brushes. This was not successful. The algae was torn loose from the walls and a large amount of it floated in the water and would attach itself to the wall again at the first opportunity.

The next method tried was taking a known amount of copper sulphate in a sack and by means of a rope attached to it, dragging the sack along the wall on which the algae was growing. The disadvantages of this method were that the current caused by the sack would carry the copper sulphate solution away from the wall and the strength of the solution being applied was unknown. This method also required a great deal of time, as the sack had to be drawn back and forth over the same wall to kill the algae growth.

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[1] Read before the Iowa Section, November 6, 1920. Discussions of this paper are invited and should be sent to the Editor.

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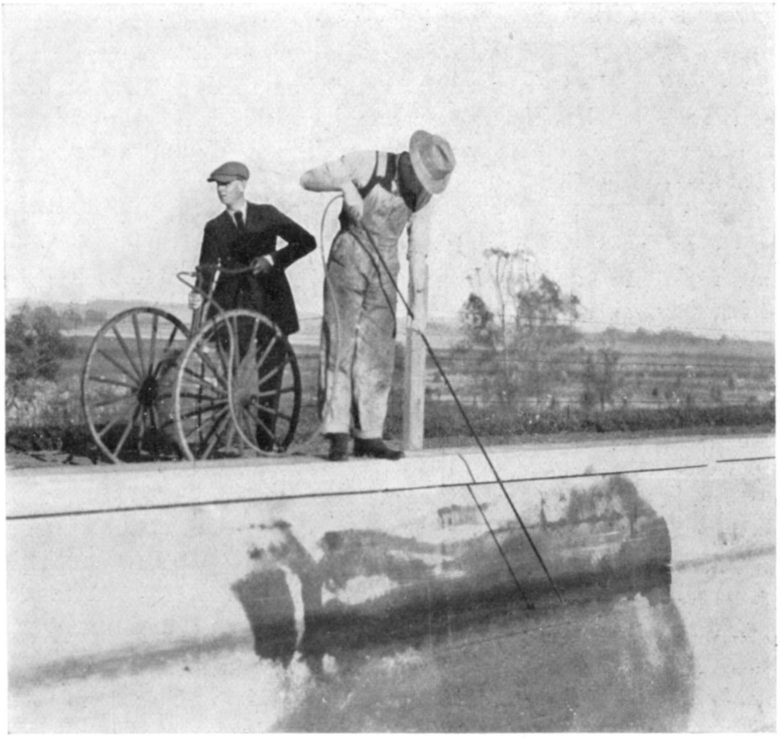
To overcome the uncertainty of concentration, an experiment was made at the Quindaro station in which the copper sulphate was applied with the coagulant to the water. Copper sulphate being incompatible with aluminum sulphate, the two were dissolved in the same solution and applied to the water as it passed over the weir by means of a perforated pipe line. The volume of water passing over the weir was known. Copper sulphate was added at this point, and in this way it was possible to calculate the parts per million in the basin. A start was made with 0.25 part per million and this was progressively increased to 1.5 parts per million. There was no apparent action on the wall growth until the concentration of the



APPLYING COPPER SULPHATE TO ALGÆ-COVERED WALL copper sulphate rached 1 part per million, and at that concentration the algae at the end of the basin at which the copper sulphate was being applied was killed, but 1.5 parts per million were necessary to clear the far wall. This experiment was followed by an enormous increase in the bacterial count in the basin. The alkalinity of the water at the time of this experiment was 185 parts per million. While chemical analyses were not made on the effluent water from this basin, it is safe to say that most of the copper sulphate was lost by reaction with the alkalinity of the water. The following varieties of fish were present in the basin; catfish, carp, perch, drum, shad, and buffalo, none of which was killed.

Copper sulphate is now used in a known strength solution, and is applied directly to the algae growth on the basin walls. The water elevation in the basin to be treated is brought down below the algae line, which is about 6 feet below the normal elevation in the basins. This leaves the algae clinging to the wall. A paint spraying pump is attached to an 8-gallon keg which is mounted on wheels and equipped with a handle. A 5 per cent aqueous solution of copper sulphate is made by dissolving 6½ pounds of copper sulphate crystals in 10 gallons of water and poured into the keg. While one man operates the pump another man directs the flow of the solution, which is delivered in a fine spray as shown in the accompanying illustration. After an hour the walls are scrubbed with a wire brush and the basin is again filled to normal elevation.

One gallon of this solution will cover 125 square feet of wall surface and can be applied by two men with a spraying machine in four minutes. By carrying out this method every two months during the warm weather, it is possible to keep the basin walls comparatively free from algae.